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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,184	06/05/2001	Stephen William Colley	KPT 1092	5402

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EXAMINER

TUCKER, ZACHARY C

ART UNIT	PAPER NUMBER
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1624

DATE MAILED: 10/10/2002

8

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicati n N .

09/806,184

Applicant(s)

COLLEY ET AL.

Examin r

Zachary C. Tucker

Art Unit

1624

-- The MAILING DATE of this communication appears on th cover sheet with th correspondenc address --  
Peri d for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 September 2002 .
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 1 (ii-iv) and 7-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_ .
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1 .
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_ .
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Election/Restrictions*

Applicant's election with traverse of Group I in Paper No. 7 is acknowledged.

Claims 1, in part (ii-iv) and 7-29 (as they depend from claim 1 in part (ii-iv)) are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention. Applicant timely traversed the election requirement.

The traversal is on the ground(s) that the Grootendorst et al reference, which has been relied upon to show that selective hydrogenation of a reactive carbonyl containing compounds does not constitute a special technical feature common to all four inventions, said special technical feature being a contribution over the prior art, does not disclose the selective hydrogenation of compounds such as butan-2-one and butyraldehyde to the corresponding alcohols. The Grootendorst et al reference instead discloses selective hydrogenation of the active-carbonyl containing compound acetic acid to acetaldehyde.

Applicant's remarks make reference to many points disclosed in the instant specification, however, there is nothing specified in the instant claims requiring the active carbonyl containing compounds to have any particular identity, or even that an alcohol must be produced by the hydrogenation of said active carbonyl containing compounds - (step "d") of claim 1 merely requires that ethanol be *contained* in the effluent from the selective hydrogenation zone.

Acetic acid is a reactive-carbonyl containing compound, and is a component of the effluent from a process for producing ethyl acetate by dehydrogenation of ethanol.

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Provided herewith is US 1,708,460 (Zeisberg) to substantiate this assertion (see col. 2, lines 7-23).

The requirement is still deemed proper and is therefore made FINAL.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In step "c" of claim 1, "selective hydrogenation conditions" are specified.

This term is indefinite for two reasons:

1. What the conditions are selective for has not been specified.
2. The conditions are not specified.

In the absence a clear specification of what the hydrogenation step is selective for and what the conditions are, the step reads on any hydrogenation step wherein a mixture comprising a carbonyl compound is hydrogenated to produce another mixture comprising an alcohol (all carbonyl groups are *reactive*).

Claims 3, 4 and 7 specify that certain ratios are "used" (ethanol:hydrogen in claims 3 and 4 and reaction product mixture:hydrogen in claim 7). A ratio is a number, and one cannot "use" a number. A number is an abstract concept.

If relative ratios of these reactants in the process are to be claimed, said claims should be specified with phraseology such as "...are present in a ratio of..."

In claim 18, an overhead stream that contains "light" components is specified. Quotation marks suggest that the components, though they might be referred to as light components, might more appropriately be designated by some other terminology, and therefore render the claim indefinite.

All other claims depend either directly or indirectly from claims rejected for being indefinite, and therefore are also indefinite.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 1, in part (i) and 2-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,027,182 (Lazier).

Lazier discloses a process for producing ethyl acetate by dehydrogenation of ethanol, which process comprises a hydrogenation step wherein unsaturated carbonyl-containing by-products of the dehydrogenation reaction are hydrogenated so as to render the by-products more valuable.

In the Lazier process, ethanol vapor is dehydrogenated over a copper oxide-containing catalyst, and the effluent gases are condensed. The effluent from the dehydrogenation reaction contains the desired ethyl acetate, along with acetaldehyde, acetone, butanol, crotyl alcohol, butyl acetate, crotyl acetate, acetic, butyric, crotonic, caprylic, and capric acids (col. 2, lines 43-55).

The effluent is distilled into three fractions, the ethanol and ethyl acetate fraction boiling at under 90°C, an intermediate fraction containing most of the crotyl alcohol and butanol boiling at about 90-130°C, and a third fraction which also contains unsaturated compounds, which boils at about 130-170°C (col. 3, lines 13-26).

The unsaturated by-products, such as crotyl alcohol, render any butyl alcohol, which might otherwise be collected as a valuable by product, unsuitable for use because of a sharp and disagreeable odor.

A primary object of the Lazier process is the production of *n*-butanol by hydrogenation of crotyl alcohol. Lazier exemplifies both platinum and nickel hydrogenation catalysts (examples 1 and 3).

The crotyl alcohol-containing fraction's boiling point range overlaps that of the ethyl acetate and ethanol-containing fraction (the former boiling at "about" 90-130°C and the latter boiling "under" 90°C). Some ethyl acetate and ethanol remain in the middle fraction after the first fraction of ethyl acetate and ethanol is distilled off.

Lazier discloses that there are at least 12 distinct compounds present in the crude reaction mixture produced by the dehydrogenation of ethanol (col. 1, lines 43-55). In order to separate this mixture into substantially pure fractions, at least 11 distillation columns would be necessary. Provided herewith is the section entitled "Distillation" from the Kirk-Othmer Encyclopedia of Chemical Technology. The last two pages of this excerpt (the pages are not numbered, the material is from the on-line edition) discuss multiple component distillations.

The distillation described in the Lazier patent (col. 3, lines 13-26) implies that only one distillation column is employed, which would result in only a rough separation of the three described fractions. Therefore, when the crotyl alcohol-containing fraction is hydrogenated in the Lazier et al process, the resultant hydrogenated mixture necessarily contains at least some traces of ethanol and ethyl acetate which were present in the crotyl alcohol-containing fraction before said hydrogenation step.

The hydrogenation step of Lazier comprises subjecting a mixture comprising reactive carbonyl containing compounds (ethyl acetate, acetone, and other carbonyl-containing compounds) to hydrogenation to produce hydrogenated by-products comprising corresponding alcohols (e.g. crotyl alcohol is hydrogenated to the corresponding alcohol *n*-butanol). Some traces of ethyl acetate and ethanol necessarily are present in the effluent from the hydrogenation step due to only a crude separation of the different fractions of the effluent from the *dehydrogenation* step having been carried out beforehand.

Step "e" of claim 1 specifies that material of the selectively hydrogenated reaction product mixture is distilled so as to produce a first composition comprising ethyl acetate and a second composition comprising ethanol and water.

The limitations specified in step "e" are met by the distillation step disclosed by Lazier in which the effluent from the *dehydrogenation* of ethanol is distilled. Step "e" requires only that "material of" the selectively hydrogenated reaction product mixture must be distilled, therefore any distillation step wherein any component of the selectively hydrogenated reaction product mixture is distilled meets this claim limitation.

In other words, step "e" of claim 1 does not require the effluent *from* the selective hydrogenation step to be distilled, only that something that is present in the selective hydrogenation step is distilled. The distillation of step "e" may occur before or after the selective hydrogenation step.

Lazier discloses that a fraction comprising ethyl acetate and ethanol is distilled off from the dehydrogenated product mixture first. A composition comprising ethyl acetate may comprise ethanol, and *vice-versa*. Designating "first" and "second" is purely arbitrary.

All of the above being explicitly disclosed in the Lazier patent, the deficiency of the Lazier disclosure is the lack of there being a step of recovering an ethanol fraction having a reduced water content in the Lazier process.

At the time the invention was made, the process of claims 1 (in part, i) and 2-29 would have been obvious to a person of ordinary skill in the art given the teaching of Lazier et al.

Recovering ethanol having a reduced water content from the ethyl acetate and ethanol containing fraction would have been motivated by a desire to obtain more starting material for the process, and thus increase the overall process efficiency. The one of ordinary skill would not discard a starting material necessary for the process.

The ranges for ethanol:hydrogen molar ratios, partial pressure of hydrogen and ethanol, liquid hourly space velocity, distillation pressures, *etc.*, are not patentable absent a showing of criticality, as the person of ordinary skill would have recognized at the time the invention was made, that said ranges were result-effective variables in



chemical processes, and would have been motivated to optimize the ranges by a desire to increase process yield and efficiency. The instant specification provides no showing that the claimed ranges provide an unexpected result.

***Allowable Subject Matter***

All claim rejections under 35 U.S.C. 103(a) will be obviated by amendments specifying that the reactive the carbonyl groups of the reactive carbonyl containing by-products resulting from the dehydrogenation of ethanol, and contained in the effluent from the ethyl acetate production zone, are selectively hydrogenated to so that alcohols corresponding to the reactive carbonyl group containing by-products are formed, and that the effluent from the selective hydrogenation zone is then distilled, followed by steps f and g.

In order to overcome the rejections under 35 U.S.C. 112, second paragraph, applicant must specify, at least in general, what the selective hydrogenation conditions are selective for, and, at least in general what the identity of the selectively hydrogenated by-products is.

*Using* a ratio for relative proportions of reactants cannot be recited as a process step, applicant should amend claims wherein such language appears so as to specify that the so-described reactants *are present* in those ratios, relative to one another.

Quotation marks must be struck from claim language.

Non-elected subject matter must be cancelled before the application can be passed to issue.

***Specification***

The instant specification does not contain a "Brief Description of the Drawings," as is required under 37 CFR 1.74, and accordingly, is objected to.

***Conclusion***

Any inquiry concerning this communication should be directed to Zachary Tucker whose telephone number is (703) 305-2050. The examiner can normally be reached Monday-Friday from 7:00am to 3:30pm. If Attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mukund Shah, can be reached at (703) 308-4716. The fax number for the organization where this application or proceeding is assigned is (703) 308-4556 for regular communications and (703) 308-4242 for after-final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

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RICHARD L. RAYMOND  
PRIMARY EXAMINER  
Mukund Shah  
ART UNIT 1624

Supervisory Patent Examiner

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